

Anatomical variation of the saphenofemoral junction – A prospective study in a population with primary superficial venous insufficiency

Variação anatômica da junção safeno-femoral – Estudo prospectivo numa população com insuficiência venosa superficial primária

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*VASCULAR SURGEONS WORKING
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| R e s u m o | | A B S T R A C T |

Introdução/Objectivos: A elevada recorrência da insuficiência venosa superficial mantém-se ainda nos dias de hoje como uma problemática constante na actividade clínica do cirurgião vascular.

A laqueação cirúrgica inadequada da Junção safeno-femoral (JSF) e das suas tributárias pode ser resultante do desconhecimento das variações anatómicas da mesma.

O objetivo do presente estudo foi descrever a anatomia da JSF numa população de doentes com varizes primárias superficiais submetidos a terapêutica cirúrgica de varizes.

Métodos: Estudo prospectivo, efectuado durante um período de tempo de 19 meses, que contemplou um total de 189 procedimentos cirúrgicos (49 bilaterais) em que se procedeu à representação esquemática da Crossa da Veia Grande Safena (VGS) e das suas tributárias. Todos os procedimentos cirúrgicos foram realizados pelo mesmo cirurgião vascular.

Resultados: 75% dos doentes eram do sexo feminino. O número de tributárias da veia

Introduction/Objectives: High recurrence rates of lower limb varicose veins after surgery are one of the biggest dilemmas in the current practice of a vascular surgeon.

Inadequate primary varicose vein surgery may be the result of a failure to appreciate the anatomical variations at the saphenofemoral junction (SFJ).

The aim of the present study was to describe the surgical anatomy of the SFJ in a population of patients with primary superficial varicose veins.

Methods: Operative findings were recorded prospectively in a consecutive series of 189 surgical procedures (140 patients) during a 19 months period of time. All the operations were performed by the same vascular surgeon.

Results: 75% patients were female. The number of tributaries at the SFJ varied from one to seven. In 29, 1% of the dissections postjunctional tributaries were identified and all of them joined the medial aspect of the Common Femoral Vein (CFV).

grande safena ou da veia femoral, identificadas dentro dos limites da abordagem cirúrgica, variou desde uma até sete. Em 29,1% dos casos foram identificadas tributárias pós-juncionais e todas se encontravam em posição medial relativamente à crossa. *Conclusão:* A introdução das novas terapêuticas veio por em causa a importância tradicionalmente atribuída à laqueação de todas as colaterais da JSF. Um conhecimento completo da anatomia da junção safeno-femoral e das suas possíveis variações mantém-se de primordial importância para promover um tratamento cirúrgico adequado da insuficiência venosa superficial assim como permitir um procedimento minimamente agressivo.

Conclusion: The introduction of the new Endovenous therapies questioned the importance given to the anatomy of the SFJ and its tributaries; nevertheless a thorough understanding of its anatomical variations is still important in insuring that the junction is managed safely and adequately in patients with varicose veins.

| **Key-words** | CHRONIC VENOUS INSUFFICIENCY | SAPHENOUS VEIN |
| SAPHENOFEMORAL JUNCTION |

| **Palavras-chave** | INSUFICIÊNCIA VENOSA CRÔNICA |

| VEIA GRANDE SAFENA |

| JUNÇÃO SAFENO-FEMORAL |

INTRODUCTION

Superficial venous insufficiency is an important clinical condition associated with a substantial source of morbidity. Operations on varicose veins are among the most common surgical procedures^[1]. Recent figures set the prevalence of this disease at 10-50% of adult males and 50-75% of the adult female population^[2].

The recurrence of varicose veins is a common and costly consequence of varicose vein surgery, the outcome of varicose vein surgery being often disappointing for both the surgeon and the patient. Over the years there has been long standing speculation about the mechanisms by which varicose veins recur; the main responsible factors have been attributed to incomplete initial assessment, neovascularization at a previously ligated sapheno-femoral junction, disease progression due to the development of new incompetent sites, inadequate primary surgery due to the anatomical variations of the SFJ or failure to ligate its groin tributaries^[2] and as well as new valve dysfunction on a previous operated leg^[3].

Venous anatomy is characterized by numerous variations, which have a certain impact on the diagnosis and the surgery. From a surgical point of view, the most important variations occur at the SFJ^[2].

To contribute to the understanding of varicose disease, the anatomy of the saphenofemoral junction was recorded in 140 patients during the operation.

METHODS

An unselected consecutive group of 140 patients with primary varicose veins was studied prospectively over an 19 months period at the vascular laboratory before surgery. These patients were clinically assessed by the recommended standard CEAP classification. All were class 3-6 disease. Initial evaluation included surgical and medical history and risk factors for chronic venous insufficiency. The complete study included 189 limbs (49 bilateral).

Operations were performed by the same consultant vascular surgeon.

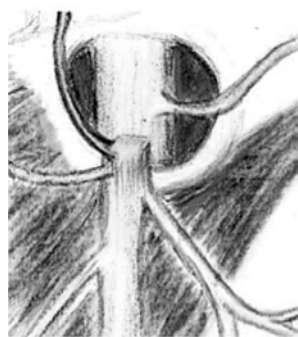
Dissection of the SFJ was carried out through a transverse skin crease incision 3-4 cm long. Direct tributaries to the GSV^[3] were dissected and ligated. The femoral vein was dissected approximately 1 cm proximal and distal to the SFJ, thus allowing the identification of all junctional tributaries including those joining the saphenofemoral confluence deeper to the deep fascia.

On completion of each groin dissection a detailed diagram of the SFJ anatomy and the course of all its tributaries was recorded.

Analysis was performed on SPSS (Statistical Package in the Social Sciences); Categorical data were presented as absolute frequencies and percent values. Chi-square test was used to compare anatomic findings.

RESULTS

During the study period, 189 consecutive operative procedures were performed (103 right lower limbs and 86 left). Seventy five percent (105) of the patients were women, with a mean (SD) age of 45, 9 (\pm 9.6 years); the mean (SD) age of the male population was 42, 4 (\pm 12, 4 years).



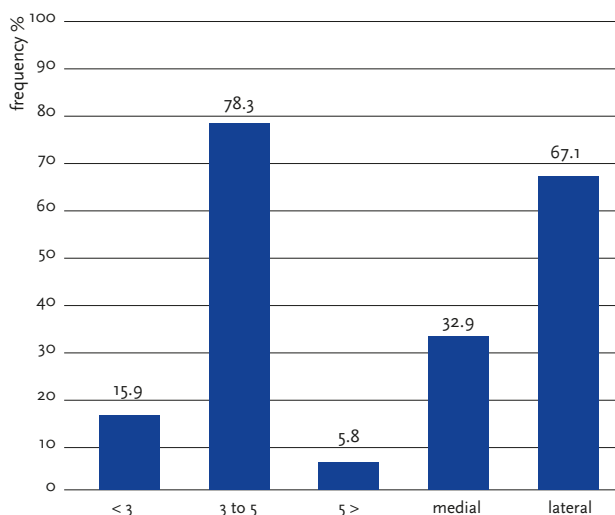
| FIGURE 1 | Anatomic model seen in 48 dissections (right SFJ)



| FIGURE 2 | Anatomic model representative of 64 dissections (right SFJ)

Two major anatomical models were assessed, one in 48 (25, 3%) dissections and other in 64 (33, 8%) being distributed according to the diagrams | FIGURE 1 AND 2 |.

The number of tributaries directly joining the GSV or CFV varied from 1 to 7. In 78, 3% (148) of the dissections there were three to five tributaries, being in 67, 1% (127) lateral to the SFJ



| FIGURE 3 | Partial frequency (%) of the number of tributaries dissected and its distribution in relation to the SFJ

| FIGURE 3|. In the male population we found 34 (70, 8%) limbs with five tributaries and in 86 limbs (60.1%) of the female population there were 3 to 4 tributaries. This population showed greater variability in the number of tributaries. No significant differences were found in tributaries distribution between men and women.

The number of tributaries on the right groin dissections was greater (5 tributaries in 72, 8% of the cases) than on the left side (3 tributaries in 65, 1% of the cases).

One or more postjunctional tributaries were identified in 29, 1% (55) of the groin dissections, all medial to the CFV. The incidence of postjunctional tributaries was significantly greater in dissections with four or less tributaries ($p < 0, 05$ Chi-Square), | TABLE 1 |.

| TABLE 1 | Number of tributaries related to the probability of appearance of a Junctional Tributary

Number of tributaries	Probability of Postjunctional tributaries
< 4	59,8%
4 to 5	25,2%
> 5	20,1%
P<0,05 – Chi-Square test	

A bifid GSV system was present in 13, 8% (26) of the surgical procedures and in 46,1% (12) of these cases one postjunctional tributary was identified.

There were found five (2, 6%) aneurismatic dilations of the GSV, 4 of them 2 cm distal to the SFJ and one in a lateral tributary of the GSV. No aneurismatic dilatation of the safenofemoral confluence was identified.

No symmetry was found concerning the morphology of the SFJ and the total number of tributaries in patients having bilateral procedure.

Surgical dissection associated with statistical analysis did not found a linear relation between the age and the total number of tributaries dissected, but all the older patients (> 60 years) needed a bilateral operative procedure.

DISCUSSION

The anatomic variability of the SFJ is traditionally considered important for the treatment of varicose veins. This attitude is based on the widely accepted theory that an incomplete surgery will result in recurrence^[4,5,6]. A double short saphenous or a double long saphenous are two major anatomical variations of the superficial venous system^[3] that are important to consider when performing a varicose vein surgery. The associations between occupational characteristics and anatomical gender differences that are reported in some studies^[3] contribute to the knowledge of gender-specific occupational risk factors for primary varicose veins.^[3]

Re-operation in venous disease is common and the increasing knowledge brought by duplex studies on the anatomy of GSV has so far not improved the operative results^[8,9]. The analysis of intra-operative anatomy gives us a concise perspective.

According to the literature, the saphenofemoral junction has four major tributaries named the superficial circumflex iliac, the superficial epigastric, superficial external pudendal vein and anterior accessory great saphenous vein that typically enter the GSV in the femoral triangle. A basic model of 3 to 5 tributaries is described in 80% of the series^[10,11,12,13]; the identification of just two tributaries is extremely rare (0.06%) and should raise a high suspicion index^[12].

The incidence of a bifid GSV has been reported to be as high as 24%^[2]; failure to identify it may

result in failure to remove the GSV from the thigh leading to reoperation rates of 66%¹².

The presence of postjunctional tributaries in our study was identified in 29.1% of all cases, a frequency slightly inferior to the 33.4% described by M. Donnelly et al^[2] in its series. We also found that the existence of four or less tributaries was associated with the finding of a postjunctional tributary; that association was also found on M. Donnelly study; the postjunctional tributaries are more frequently located medial to the saphenofemoral confluence (76.2%) but they can assume other localizations^[2]. In our series all the postjunctional tributaries were located medial to the SFJ which could be the expression of an anatomic characteristic of our population. The prevalence of venous disease is widely described in medical literature, being 10-50% of adult males and 50-75% of the adult female population^[2]. In our series 25 % were male and 75 % female which adjusts to the contemporary reality.

The greater prevalence of bilateral surgical procedures in older patients agrees with the progressive nature of primary venous insufficiency.

The question about not to dissect the groin when we are using endolaser or radiofrequency ablation to treat venous disease can only be answered by long term prospective studies, but recurrent varicose veins are as well described in the literature secondary to this treatment modalities^[13]. Moreover these procedures are not feasible in all the patients, so a well performed surgery will still offer the most valuable alternative for these patients^[13].

In a publication by Bridget Egan et al^[1], a per operative analysis of the anatomy of SFJ associated with its previous study by duplex ultrasonography in patients with recurrent varicose veins showed that the main causes for recurrence were: the identification of a GSV stump with non ligated tributaries in 37.6% of the cases, a complete intact SFJ in 17.4%, non identification of a bifid system in 18.1% and the presence of non ligated junctional tributaries in 16.8%. This contemporary data favors the previous importance given to the correct knowledge of GSV

anatomy and its anatomic variability in order to achieve a good surgical result.

CONCLUSION

With the introduction of endovenous therapies the common importance given to the anatomy of the SFJ and its tributaries has declined in priority. The particular population we studied showed some variability in the anatomy of the

SFJ. Nevertheless we could find two major anatomic models which included almost 60% of the dissections. Patients having a bilateral procedure did not necessarily present a symmetric anatomy.

A complete knowledge of the anatomical variations of the SFJ is important in insuring that the junction is safely managed, less aggressively and with more efficiency in order that high quality surgery will always remain the standard.

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